

DERWENT-ACC-NO: 2000-446295

DERWENT-WEEK: 200039

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TITLE: Ink cartridge identification device for inkjet  
printer,  
has identification circuit to determine whether  
ink  
cartridge is monochrome or color by comparing  
output of  
counter with preset result

PATENT-ASSIGNEE: FUNAI DENKI KK[FUNAN]

PRIORITY-DATA: 1998JP-0337967 (November 27, 1998)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
PAGES MAIN-IPC		
JP 2000158664 A	June 13, 2000	N/A
B41J 002/175		007

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO
APPL-DATE		
JP2000158664A	N/A	1998JP-0337967
November 27, 1998		

INT-CL (IPC): B41J002/175

ABSTRACTED-PUB-NO: JP2000158664A

BASIC-ABSTRACT:

NOVELTY - An identification circuit (5) identifies whether the ink cartridge is monochrome or color depending on comparison made between output of counters (41-44) and standard number of nozzles set beforehand for every block. The counters counts the number of nozzles arranged in every block.

USE - For identifying whether ink cartridge is monochrome or color in inkjet printer.

ADVANTAGE - Since ink cartridge is identified by comparing the number of nozzles in block with preset number of nozzles of every block, the ink cartridge is identified with more accuracy.

DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of ink

*JAMAZAWA*

cartridge  
identification device.

Identification circuit 5

Counters 41-44

CHOSEN-DRAWING: Dwg.1/4

TITLE-TERMS: INK CARTRIDGE IDENTIFY DEVICE PRINT IDENTIFY CIRCUIT  
DETERMINE INK

CARTRIDGE MONOCHROME COMPARE OUTPUT COUNTER PRESET RESULT

DERWENT-CLASS: P75 T04

EPI-CODES: T04-G02B;

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: N2000-333199

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2000-158664

(P2000-158664A)

(43) 公開日 平成12年6月13日 (2000.6.13)

(51) Int.Cl.<sup>7</sup>

B 4 1 J 2/175

識別記号

F I

B 4 1 J 3/04

テーマコード\* (参考)

1 0 2 Z 2 C 0 5 6

審査請求 未請求 請求項の数 3 O L (全 7 頁)

(21) 出願番号 特願平10-337967

(22) 出願日 平成10年11月27日 (1998.11.27)

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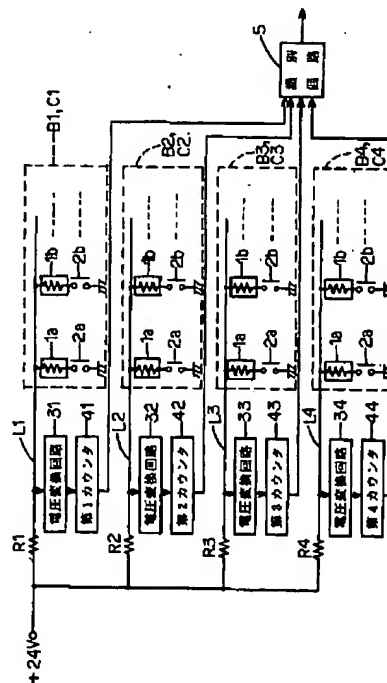
Fターム(参考) 2C056 EA22 EB20 EB44 EB45 KC01

(54) 【発明の名称】 インクカートリッジ識別装置

(57) 【要約】

【課題】 装着されたインクカートリッジの識別精度を向上させる。

【解決手段】 カラーインクカートリッジとモノクロインクカートリッジとが交換装着可能であって、装着されたインクカートリッジのドットに対応したノズルが複数のブロックに分割され、各ブロックごとに印字制御するように構成されたインクジェットプリンタのインクカートリッジ識別装置であって、各ブロックのノズル数に対応するスピット数をブロックごとにカウントする第1ないし第4カウンタ41～44と、これらカウンタ41～44によってカウントされた各ブロックのスピット数と、予め各ブロックごとに設定された基準スピット数とをそれぞれ比較することによって、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別する識別回路5とを備えている。



## 【特許請求の範囲】

【請求項1】 カラーインクカートリッジとモノクロインクカートリッジとが交換装着可能であって、装着されたインクカートリッジのドットに対応したノズルが複数のブロックに分割され、各ブロックごとに印字制御するように構成されたインクジェットプリンタのインクカートリッジ識別装置において、

前記各ブロックのノズル数に対応するスピット数をブロックごとにカウントするカウント手段と、

このカウント手段によってカウントされた各ブロックのスピット数と予め各ブロックごとに設定された基準スピット数とをそれぞれ比較することによって、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別する識別手段とを備えたことを特徴とするインクカートリッジ識別装置。

【請求項2】 インクカートリッジのノズルに対応したスピットが第1象限から第4象限までの4つのブロックに分割されるとともに、第1象限から第3象限までの基準となる第1基準スピット数と、第4象限での基準となる第2基準スピット数とが設定され、

前記識別手段は、前記カウント手段による第1象限から第3象限までのそれぞれのカウント値を前記第1基準スピット数とそれぞれ比較するとともに、前記カウント手段による第4象限のカウント値を前記第2基準スピット数と比較し、いずれかの比較結果に基づいて、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別する請求項1に記載のインクカートリッジ識別装置。

【請求項3】 前記識別手段は、前記カウント手段による第1象限から第3象限までのそれぞれのカウント値と前記第1基準スピット数とを順次比較し、いずれかの比較においてカウント値が第1基準スピット数を超えている場合には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し、すべての比較においてカウント値が第1基準スピット数以下である場合には、次に第4象限のカウント値と前記第2基準スピット数とを比較し、その比較の結果、カウント値が第2基準スピット数を超えている場合には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し、カウント値が第2基準スピット数以下である場合には、装着されているインクカートリッジがカラーインクカートリッジであると識別する請求項2に記載のインクカートリッジ識別装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、カラーインクカートリッジとモノクロインクカートリッジとが交換装着可能であって、装着されたインクカートリッジのドットに対応したノズルが複数のブロックに分割され、各ブロッ

クごとに印字制御するように構成されたインクジェットプリンタのインクカートリッジ識別装置に関する。

## 【0002】

【従来の技術】 従来より、装着されたインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別する手段を備えたインクジェットプリンタが提案されている。この識別手段には、機械的な識別方法と、電気的な識別方法とがあり、機械的な識別方法については、例えば特開平9-314859号公報に記載のインクジェット記録装置がある。

【0003】 この従来のインクジェット記録装置は、インクカートリッジの色の種類を表示する表示板が装置本体に取り付けられており、カラーインクカートリッジ及びモノクロインクカートリッジには、それぞれ異なる位置に突起部が形成されている。そして、例えばカラーインクカートリッジを装置本体に装着すると、カラーインクカートリッジに形成された突起部の作用によってカラー表示された表示板が装置本体から突出し、モノクロインクカートリッジを装置本体に装着すると、モノクロインクカートリッジに形成された突起部の作用によってモノクロ表示された表示板が装置本体から突出するようになっている。

【0004】 一方、電気的な識別方法としては、装着されたインクカートリッジのドットに対応したスピット数をカウントすることによって、カラーインクカートリッジかモノクロインクカートリッジかの識別を行っている。すなわち、カラーインクカートリッジとモノクロインクカートリッジとでは、総スピット数が異なっており、カラーインクカートリッジでは50、モノクロインクカートリッジでは56となっている。そのため、従来の識別方法では、カウントした総スピット数が50を超えるかどうかで識別しており、総スピット数が50を超える（すなわち、51以上）である場合には、モノクロインクカートリッジであると識別し、50以下である場合には、カラーインクカートリッジであると識別している。

## 【0005】

【発明が解決しようとする課題】 しかしながら、上記した従来の電気的な識別方法では、各ドットに対応したヒータの故障によりノズル不良が発生し、例えばモノクロインクカートリッジの6ノズル分のスピットがカウントできなくなると、モノクロインクカートリッジであるにも係わらず、総スピット数が50とカウントされてしまい、その結果、カラーインクカートリッジであると誤判定してしまうといった問題があった。

【0006】 ところで、インクジェットプリンタは、装着されたインクカートリッジのドットに対応したノズルを複数のブロックに分割し、各ブロックごとにノズルを制御して印字出力する構成となっており、各ブロックのノズル数、すなわちスピット数は、モノクロインクカー

トリッジとカラーインクカートリッジとで異なっている。

【0007】本発明はこのような点に着目して創案されたものであって、その目的は、各ブロックごとにカウントされたスピット数が、モノクロインクカートリッジのスピット数であるのか、カラーインクカートリッジのスピット数であるのかをブロックごとに識別することによって、装着されたインクカートリッジの識別精度をより向上させたインクカートリッジ識別装置を提供することにある。

【0008】

【課題を解決するための手段】上記課題を解決するため、本発明のインクカートリッジ識別装置は、カラーインクカートリッジとモノクロインクカートリッジとが交換装着可能であって、装着されたインクカートリッジのドットに対応したノズルが複数のブロックに分割され、各ブロックごとに印字制御するように構成されたインクジェットプリンタのインクカートリッジ識別装置において、前記各ブロックのノズル数に対応するスピット数をブロックごとにカウントするカウント手段と、このカウント手段によってカウントされた各ブロックのスピット数と予め各ブロックごとに設定された基準スピット数とをそれぞれ比較することによって、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別する識別手段とを備えた構成とする。

【0009】また、本発明のインクカートリッジ識別装置は、上記構成において、インクカートリッジのドットに対応したスピットが第1象限から第4象限までの4つのブロックに分割されるとともに、第1象限から第3象限までの基準となる第1基準スピット数と、第4象限での基準となる第2基準スピット数とが設定され、前記識別手段は、前記カウント手段による第1象限から第3象限までのそれぞれのカウント値を前記第1基準スピット数とそれぞれ比較するとともに、前記カウント手段による第4象限のカウント値を前記第2基準スピット数と比較し、いずれかの比較結果に基づいて、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別するものである。

【0010】また、本発明のインクカートリッジ識別装置は、上記構成において、前記識別手段は、前記カウント手段による第1象限から第3象限までのそれぞれのカウント値と前記第1基準スピット数とを順次比較し、いずれかの比較においてカウント値が第1基準スピット数を超えている場合には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し、すべての比較においてカウント値が第1基準スピット数以下である場合には、次に第4象限のカウント値と前記第2基準スピット数とを比較し、その比較の結果、カウ

ント値が第2基準スピット数を超えている場合には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し、カウント値が第2基準スピット数以下である場合には、装着されているインクカートリッジがカラーインクカートリッジであると識別するものである。

【0011】

【発明の実施の形態】以下、本発明の実施の形態について、図面を参照して説明する。図2及び図3は、インクカートリッジペンの電気的な端子のノズルを下に向けて見たときのコンタクト接点の配置の一例を示しており、図2がモノクロインクカートリッジの配置図、図3がカラーインクカートリッジの配置図である。

【0012】図2及び図3から明らかなように、コンタクト接点全体の配置はモノクロインクカートリッジもカラーインクカートリッジも変わらないが、カラーインクカートリッジでは、モノクロインクカートリッジに比べて、使用しないコンタクト接点が6個多く、そのため、コンタクト接点の総数で見たときには、モノクロインクカートリッジのコンタクト接点が56個（スピット数が56）、カラーインクカートリッジのコンタクト接点が50個（スピット数50）となっている。このように配置されたコンタクト接点は、それぞれ4つのブロックB1～B4、C1～C4に分割されており、各ブロックごとにコンタクト接点のオン、オフ制御を行うことにより、印字出力するようになっている。

【0013】ここで、モノクロインクカートリッジのコンタクト接点とカラーインクカートリッジのコンタクト接点を、各象限（ブロック）で比較すると、第1象限B1、C1から第3象限B3、C3までは、モノクロインクカートリッジのコンタクト接点数が14個、カラーインクカートリッジのコンタクト接点数が13個となっており、第4象限B4、C4では、モノクロインクカートリッジのコンタクト接点数が14個、カラーインクカートリッジのコンタクト接点数が11個となっている。なお、図2及び図3に示すように、コンタクト接点には1～56までの番号が付されており、この番号は図示しないノズルの番号と一致している。

【0014】図1は、このように配置されたコンタクト接点を含む本発明のインクカートリッジ識別装置の電気的構成を示すブロック図である。すなわち、各ブロックは同じ構成となっており、各抵抗R1～R4を介して電源電圧（+24V）に接続される各ブロックのコモンリードL1～L4には、各ブロックのノズル数に対応した数のヒータ1a、1b・・・の一端部がそれぞれ接続されており、他端部は、図示していない駆動回路によってオン、オフ制御されるスイッチ素子（図2及び図3に示すコンタクト接点に対応）2a、2b・・・を介してアースに接続されている。

【0015】また、各ブロックのコモンリードL1～L

4には、電源電圧(+24V)を5V電圧に変換する電圧変換回路31~34がそれぞれ接続されており、各電圧変換回路31~34の出力は、各ブロックのノズル数(すなわち、スピット数)をカウントする第1ないし第4カウンタ41~44にそれぞれ接続されている。そして、各カウンタ41~44のカウント値は、装着されているインクカートリッジの種類(カラーインクカートリッジであるのかモノクロインクカートリッジであるのか)を識別する識別回路5に導かれており、識別回路5での識別結果が、図示していないプリンタ全体を制御するシステムコントローラに与えられるようになってい

る。  
【0016】第1ないし第4カウンタ41~44は、スイッチ素子2a, 2b...がオンすることによってヒータ1a, 2a...が通電されると、これを検知してカウントアップするようになっている。そのため、ヒータが断線等して故障すると、そのヒータに対応するノズルのスピットがカウントされないことになる。識別回路5は、これら第1ないし第4カウンタ41~44によってカウントされた各ブロックのスピット数と、予め各ブ

ロックごとに設定された基準スピット数とをそれぞれ比較することによって、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかの識別を行う。  
【0017】ここで、本実施の形態では、第1象限から第3象限までは、モノクロインクカートリッジとカラーインクカートリッジとのコンタクト接点数が同じ(モノクロインクカートリッジが14個、カラーインクカートリッジが13個)であるので、第1象限から第3象限までの基準となる第1基準スピット数を13に設定する。また、第4象限でのモノクロインクカートリッジのコンタクト接点数が14個、カラーインクカートリッジのコンタクト接点数が11個であるので、第4象限での基準となる第2基準スピット数を11に設定する。

【0018】すなわち、識別回路5は、第1ないし第3カウンタ41~43による第1象限から第3象限までのそれぞれのカウント値を第1基準スピット数(13)とそれぞれ比較するとともに、第4カウンタ44による第4象限のカウント値を第2基準スピット数(11)と比較し、いずれかの比較結果に基づいて、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別するようになっている。

【0019】次に、上記構成のインクカートリッジ識別装置によって、装着されているインクカートリッジがモノクロインクカートリッジであるのかカラーインクカートリッジであるのかを識別する処理動作を、図4に示すフローチャートを参照して説明する。

【0020】インクカートリッジが装着されると、図示しないシステムコントローラは、各ブロックごとにヒ-

タ1a, 1b...を順次オンしてノズルからインクをスピットし、そのスピット数を各カウンタ41~44でカウントし、そのカウント値(スピット数)を識別回路5に入力する(ステップS1)。識別回路5は、まず各カウンタ41~44から得られたスピット数を合計して、総スピット数を計数し(ステップS2)、総スピット数がカラーインクカートリッジの場合の総スピット数である50より多いか少ないかを判断する(ステップS3)。そして、総スピット数>50である場合(ステップS3でYesの場合)には、装着されたインクカートリッジがモノクロインクカートリッジであると識別し(ステップS9)、その識別結果をシステムコントローラに供給する。

【0021】一方、総スピット数≤50である場合(ステップS3でNoの場合)には、ステップS4へと動作を進めて、次に各象限ごとのスピット数と、予め設定された第1基準スピット数(13)及び第2基準スピット数(11)との比較を行う。すなわち、象限を示す変数Nに1を設定し(ステップS4)、次のステップS5でN=4でないことを確認した後(すなわち、第4象限でないことを確認した後)、第1象限のスピット数と第1基準スピット数(13)とを比較する(ステップS6)。そして、スピット数が第1基準スピット数(13)を超えている場合(ステップS6でYesの場合)には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し(ステップS9)、その識別結果をシステムコントローラに供給する。

【0022】一方、ステップS6において、スピット数が第1基準スピット数(13)以下である場合には、変数Nの値をインクリメントし(ステップS7)、ステップS5でN=4でないことを確認した後、第2象限のスピット数と第1基準スピット数(13)とを比較する(ステップS6)。そして、スピット数が第1基準スピット数(13)を超えている場合(ステップS6でYesの場合)には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し(ステップS9)、その識別結果をシステムコントローラに供給する。

【0023】一方、ステップS6において、スピット数が第1基準スピット数(13)以下である場合には、変数Nの値をインクリメントし(ステップS7)、ステップS5でN=4でないことを確認した後、第3象限のスピット数と第1基準スピット数(13)とを比較する(ステップS6)。そして、スピット数が第1基準スピット数(13)を超えている場合(ステップS6でYesの場合)には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し(ステップS9)、その識別結果をシステムコントローラに供給する。

【0024】一方、ステップS6において、スピット数

が第1基準スピット数(13)以下である場合には、変数Nの値をインクリメントし(ステップS7)、ステップS5でN=4であるか否かを確認する。この場合には、N=4となるので、ステップS8へと動作を進め、第4象限のスピット数と第2基準スピット数(11)とを比較する。そして、スピット数が第2基準スピット数(11)を超えている場合(ステップS8でYesの場合)には、装着されているインクカートリッジがモノクロインクカートリッジであると識別し(ステップS9)、その識別結果をシステムコントローラに供給する。

【0025】一方、ステップS8において、スピット数が第2基準スピット数(11)以下である場合(ステップS8でNoの場合)には、装着されているインクカートリッジがカラーインクカートリッジであると識別し(ステップS10)、その識別結果をシステムコントローラに供給する。

【0026】以上説明したように、本実施の形態では、まず最初に、従来と同様の総スピット数による識別を行い(ステップS3)、その識別結果がモノクロインクカートリッジでないと判断されたとき、続けて各象限ごとの判断を行うようにしている。つまり、従来の識別手順に、本発明の識別手順を新たに加味することによって、より正確にインクカートリッジの識別が行えるようにしている。ただし、従来の識別手順であるステップS2、ステップS3を省略して、本発明の識別手順のみ(すなわち、ステップS1、ステップS4～ステップS10)を実施するようにしても、従来より正確にインクカートリッジの識別が行えることは当然である。

【0027】

【発明の効果】本発明のインクカートリッジ識別装置は、各ブロックのノズル数に対応するスピット数をブロックごとにカウントするカウント手段と、このカウント

手段によってカウントされた各ブロックのスピット数と予め各ブロックごとに設定された基準スピット数とをそれぞれ比較することによって、装着されているインクカートリッジがカラーインクカートリッジであるのかモノクロインクカートリッジであるのかを識別する識別手段とを備えた構成としている。すなわち、各ブロックごとにスピット数を比較することによって、総スピット数のみで判断していた従来の方法と比べて、装着されたインクカートリッジの種類をより正確に識別することができる。

【図面の簡単な説明】

【図1】本発明のインクカートリッジ識別装置の電氣的構成を示すブロック図である。

【図2】モノクロインクカートリッジペンの電氣的な端子のノズルを下に向けて見たときのコンタクト接点の配置図である。

【図3】カラーインクカートリッジペンの電氣的な端子のノズルを下に向けて見たときのコンタクト接点の配置図である。

【図4】装着されているインクカートリッジがモノクロインクカートリッジであるのかカラーインクカートリッジであるのかを識別する処理動作を説明するためのフローチャートである。

【符号の説明】

1a, 1b ヒータ

2a, 2b スイッチ素子(コンタクト接点)

5 識別回路

31～34 電圧変換回路

41 第1カウンタ

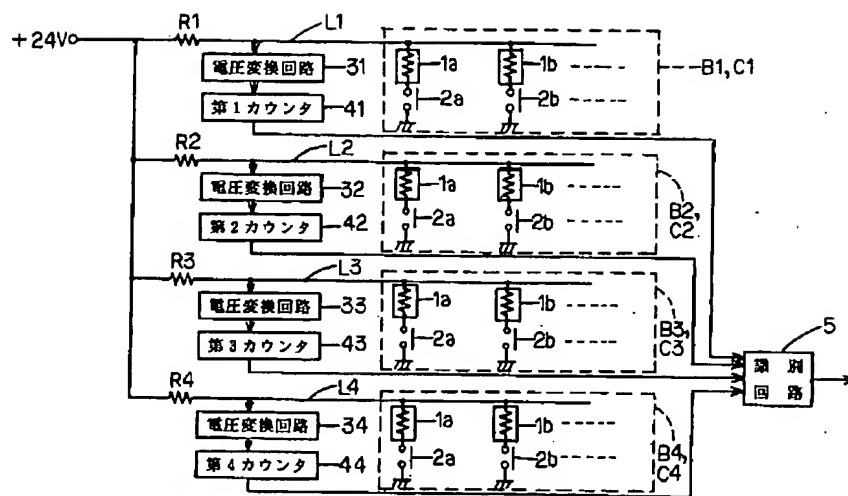
42 第2カウンタ

43 第3カウンタ

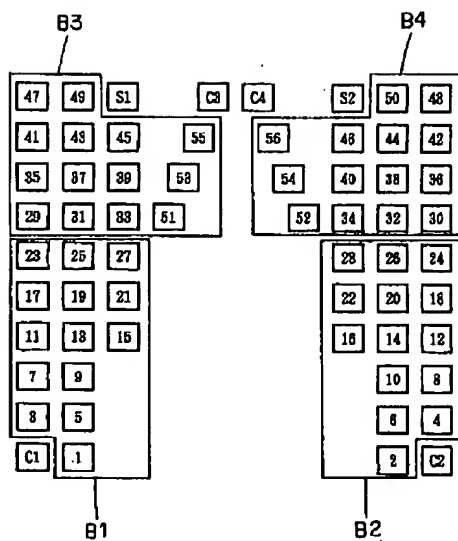
44 第4カウンタ

L1～L4 コモンリード

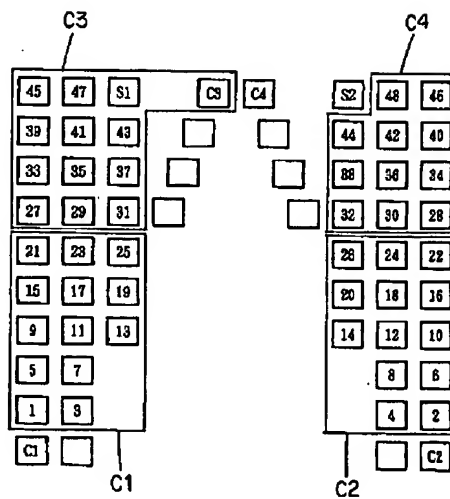
【図1】



【図2】

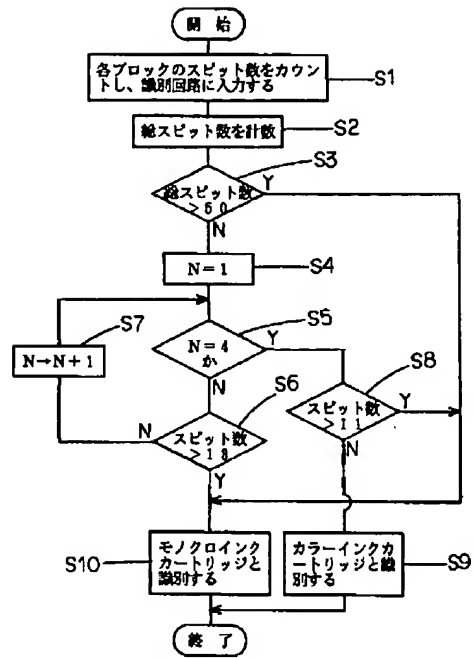


【図3】





【図4】



## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-158664

(43)Date of publication of application : 13.06.2000

(51)Int. CI.

B41J 2/175

(21)Application number : 10-337967

(71)Applicant : FUNAI ELECTRIC CO LTD

(22)Date of filing : 27.11.1998

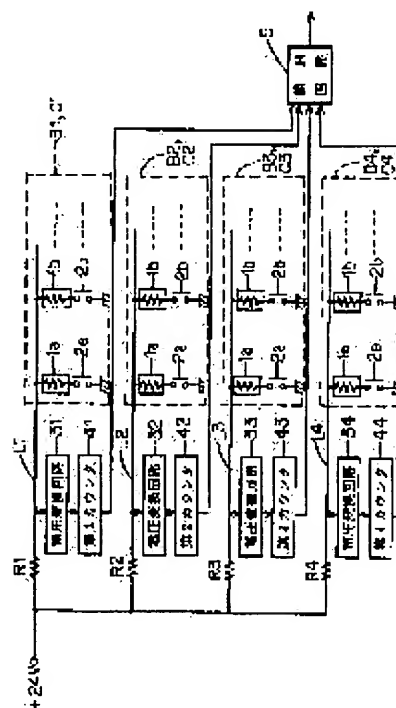
(72)Inventor : HAMAZAWA YOSHINORI

## (54) INK CARTRIDGE IDENTIFYING APPARATUS

## (57)Abstract:

PROBLEM TO BE SOLVED: To enhance identification accuracy of ink cartridge by identifying the number of spits of a monochromatic ink cartridge and a color ink cartridge for each block.

SOLUTION: First through fourth counters 41-44 count the number of nozzles (i.e., the number of spits) of each block. When switch elements 2a, 2b,... are turned on, heaters 1a, 2a,... are conducted and the conduction is detected to up count the spit. When a heater fails due to disconnection, for example, spit of a nozzle corresponding to that heater is not counted. An identifying circuit 5 compares the number of spits of each block counted by the first through fourth counters 41-44, respectively, with a reference number of spits set for each block. Consequently, a decision can be made whether a color ink cartridge is mounted or a monochromatic ink cartridge is mounted.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

Counter Not Function

of clk signal but rather

counts spit

of ink

nozzle

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's  
decision of rejection]

[Date of requesting appeal against  
examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] Exchange wearing of a color ink cartridge and a monochrome ink cartridge is possible. In the ink cartridge identification unit of the ink jet printer constituted so that the nozzle corresponding to the dot of the ink cartridge with which it was equipped might be divided into two or more blocks and might carry out printing control for every block A count means to count the number of spits corresponding to the number of nozzles of said the block of each for every block, By comparing the number of spits of each block counted with this count means with the number of criteria spits beforehand set up for every block, respectively The ink cartridge identification unit characterized by having a discernment means to identify whether the ink cartridge with which it is equipped is a color ink cartridge, and whether it is a monochrome ink cartridge.

[Claim 2] While the spit corresponding to the nozzle of an ink cartridge is divided into four blocks from the 1st quadrant to the 4th quadrant The criteria from the 1st quadrant to the 3rd quadrant, the becoming number of the 1st criteria spits, and the criteria in the 4th quadrant and the becoming number of the 2nd criteria spits are set up. Said discernment means While comparing each counted value from the 1st quadrant by said count means to the 3rd quadrant with said number of the 1st criteria spits, respectively The counted value of the 4th quadrant by said count means is compared with said number of the 2nd criteria spits. The ink cartridge identification unit according to claim 1 which identifies whether the ink cartridge with which it is equipped is a color ink cartridge, and whether it is a monochrome ink cartridge based on one of comparison results.

[Claim 3] Said discernment means carries out the sequential comparison of each counted value and said number of the 1st criteria spits from the 1st quadrant by said count means to the 3rd quadrant. When counted value is over the number of the 1st criteria spits in one of comparisons Identify that the ink cartridge with which it is equipped is a monochrome ink cartridge, and when counted value is below the number of the 1st criteria spits in all comparisons next, when the counted value and said number of the 2nd criteria spits of the 4th quadrant are compared and counted value is over the number of the 2nd criteria spits as a result of the comparison Identify that the ink cartridge with which it is equipped is a monochrome ink cartridge, and when counted value is below the number of the 2nd criteria spits The ink cartridge identification unit according to claim 2 identified as the ink cartridge with which it is equipped is a color ink cartridge.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] The nozzle corresponding to the dot of the ink cartridge which exchange wearing was possible for the color ink cartridge and the monochrome ink cartridge, and was equipped with them is divided into two or more blocks; and this invention relates to the ink cartridge identification unit of the ink jet printer constituted so that printing control might be carried out for every block.

[0002]

[Description of the Prior Art] The ink jet printer equipped with a means to identify conventionally whether the ink cartridge with which it was equipped is a color ink cartridge, and whether it is a monochrome ink cartridge is proposed. There are the mechanical discernment approach and the electric discernment approach in this discernment means, and the ink jet recording device of a publication is, for example in JP,9-314859,A about the mechanical discernment approach.

[0003] The height is formed in the location where the display board with which this conventional ink jet recording apparatus displays the class of color of an ink cartridge is attached in the body of equipment, and differ in a color ink cartridge and a monochrome ink cartridge, respectively. And if the display board color display was carried out [ the display board ] by the operation of the height formed in the color ink cartridge when the body of equipment was equipped with the color ink cartridge, for example equips the body of equipment with a projection and a monochrome ink cartridge from the body of equipment, the display board the monochrome display was carried out [ the display board ] by the operation of the height formed in the monochrome ink cartridge projects from the body of equipment.

[0004] On the other hand, as the electric discernment approach, discernment of a color ink cartridge or a monochrome ink cartridge is performed by counting the number of spits corresponding to the dot of the ink cartridge with which it was equipped. That is, the color ink cartridge differs in the total number of spits from the monochrome ink cartridge, and it has become 56 by 50 and the monochrome ink cartridge at the color ink cartridge. therefore, by the conventional discernment approach, it is identifying by whether the counted total number of spits exceeds 50, and the total number of spits exceeds 50 (51 or more [ namely, ]) -- it is -- to the case, it identifies that it is a monochrome ink cartridge, and in being 50 or less, it is identifying that it is a color ink cartridge.

[0005]

[Problem(s) to be Solved by the Invention] However, by the above-mentioned conventional electric discernment approach, when a poor nozzle occurs by failure of the heater corresponding to each dot, for example, it became impossible to have counted the spit for six nozzles of a monochrome ink cartridge, in spite of having been a monochrome ink cartridge, the total number of spits will count among 50, consequently there was a problem of carrying out a misjudgment law to it being a color ink

cartridge.

[0006] By the way, an ink jet printer divides into two or more blocks the nozzle corresponding to the dot of the ink cartridge with which it was equipped, and has composition which controls and carries out the printout of the nozzle for every block, and it differs from each other by the monochrome ink cartridge and the color ink cartridge, the number of nozzles, i.e., number of spits, of each block.

[0007] It is in offering the ink cartridge identification unit which raised more the discernment precision of the ink cartridge with which it was equipped by originating this invention paying attention to such a point, and identifying for every block whether the number of spits counted for every block is the number of spits of a monochrome ink cartridge, and whether the purpose is the number of spits of a color ink cartridge.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the ink cartridge identification unit of this invention Exchange wearing of a color ink cartridge and a monochrome ink cartridge is possible. In the ink cartridge identification unit of the ink jet printer constituted so that the nozzle corresponding to the dot of the ink cartridge with which it was equipped might be divided into two or more blocks and might carry out printing control for every block A count means to count the number of spits corresponding to the number of nozzles of said the block of each for every block, By comparing the number of spits of each block counted with this count means with the number of criteria spits beforehand set up for every block, respectively The ink cartridge with which it is equipped considers as the configuration equipped with a discernment means to identify whether it is a color ink cartridge and whether it is a monochrome ink cartridge.

[0009] Moreover, the ink cartridge identification unit of this invention In the above-mentioned configuration, while the spit corresponding to the dot of an ink cartridge is divided into four blocks from the 1st quadrant to the 4th quadrant The criteria from the 1st quadrant to the 3rd quadrant, the becoming number of the 1st criteria spits, and the criteria in the 4th quadrant and the becoming number of the 2nd criteria spits are set up. Said discernment means While comparing each counted value from the 1st quadrant by said count means to the 3rd quadrant with said number of the 1st criteria spits, respectively The ink cartridge equipped with the counted value of the 4th quadrant by said count means based on one of comparison results as compared with said number of the 2nd criteria spits identifies whether it is a color ink cartridge and whether it is a monochrome ink cartridge.

[0010] Moreover, the ink cartridge identification unit of this invention In the above-mentioned configuration, said discernment means carries out the sequential comparison of each counted value and said number of the 1st criteria spits from the 1st quadrant by said count means to the 3rd quadrant. When counted value is over the number of the 1st criteria spits in one of comparisons Identify that the ink cartridge with which it is equipped is a monochrome ink cartridge, and when counted value is below the number of the 1st criteria spits in all comparisons next, when the counted value and said number of the 2nd criteria spits of the 4th quadrant are compared and counted value is over the number of the 2nd criteria spits as a result of the comparison It identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge, and when counted value is below the number of the 2nd criteria spits, it identifies that the ink cartridge with which it is equipped is a color ink cartridge.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 2 and drawing 3 show an example of arrangement of the contact contact when turning the nozzle of the electric terminal of an ink cartridge pen downward, and seeing it, drawing 2 is the plot plan of a monochrome ink cartridge, and drawing 3 is the plot plan of a color ink cartridge.

[0012] Arrangement of the whole contact contact does not change a monochrome ink cartridge or color ink cartridge, either, so that clearly from drawing 2 and drawing 3 , but by the color ink cartridge, there are many six contact contacts which are not used compared with a monochrome ink cartridge, therefore when it sees in the total of a contact contact, the contact contact of 56 pieces (the number of spits is 56) and a color ink cartridge is [ the contact contact of a monochrome ink cartridge ] 50 pieces (50 spits). Thus, the arranged contact contact is divided into four blocks B1 - B4, and C1-C4, respectively, and carries out a printout by performing ON of a contact contact, and OFF control for every block.

[0013] If each quadrant (block) compares the contact contact of a monochrome ink cartridge, and the contact contact of a color ink cartridge, here The 1st quadrant B1 and C1 to the 3rd quadrant B3 and C3 The number of contact contacts of 14 pieces and a color ink cartridge is [ the number of contact contacts of a monochrome ink cartridge ] 13 pieces. In 4th quadrant B4 and C4 The number of contact contacts of 14 pieces and a color ink cartridge is [ the number of contact contacts of a monochrome ink cartridge ] 11 pieces. In addition, as shown in drawing 2 and drawing 3 , the number to 1-56 is given to the contact contact, and this number is in agreement with the number of the nozzle which is not illustrated.

[0014] Drawing 1 is the block diagram showing the electric configuration of the ink cartridge identification unit of this invention including the contact contact arranged in this way. namely, for the common leads L1-L4 of each block which each block has the same composition and is connected to supply voltage (+24V) through each resistance R1-R4 Heaters 1a and 1b of the number corresponding to the number of nozzles of each block ... The end section is connected, respectively. The other end switching device (it corresponds to contact contact shown in drawing 2 and drawing 3 ) 2a by which OFF control is turned on and carried out in the drive circuit which is not illustrated, and 2b -- it connects with the ground through ...

[0015] Moreover, the electrical-potential-difference conversion circuits 31-34 which transform supply voltage (+24V) into 5V electrical potential difference are connected to the common leads L1-L4 of each block, respectively, and the output of each electrical-potential-difference conversion circuits 31-34 is connected to the 1st thru/or the 4th counter 41-44 which counts the number of nozzles of each block (namely, the number of spits), respectively. And the counted value of each counters 41-44 is led to the discrimination decision circuit 5 which identifies the class (is it a color ink cartridge and is a monochrome ink cartridge?) of ink cartridge with which it is equipped, and is given to the system controller with which the discernment result in a discrimination decision circuit 5 controls the whole printer which is not illustrated.

[0016] the 1st thru/or the 4th counter 41-44 -- switching device 2a and 2b ... turns on -- Heaters 1a and 2a -- if ... energizes, this will be detected and it will count up. Therefore, if a heater carries out an open circuit etc. and breaks down, the spit of the nozzle corresponding to the heater will not count. It identifies whether the ink cartridge with which it is equipped by comparing the number of spits of each block counted with these [ 1st ] thru/or the 4th counter 41-44 with the number of criteria spits beforehand set up for every block, respectively is a color ink cartridge, and whether a discrimination decision circuit 5 is a monochrome ink cartridge.

[0017] Here, with the gestalt of this operation, since the number of contact contacts of a monochrome ink cartridge and a color ink cartridge is the same (a monochrome ink cartridge is 14 pieces and a color ink cartridge is 13 pieces), the 1st quadrant to the 3rd quadrant sets the number of the 1st criteria spits used as the criteria from the 1st quadrant to the 3rd quadrant as 13. Moreover, the number of contact contacts of the monochrome ink cartridge in the 4th quadrant sets as 11 the number of the 2nd criteria spits which serves as criteria in the 4th quadrant since the number of contact contacts of 14 pieces and a color ink cartridge is 11 pieces.

[0018] Namely, while a discrimination decision circuit 5 compares each counted value from the 1st quadrant by the 1st thru/or the 3rd counter 41-43 to the 3rd quadrant with the number of the 1st criteria spits (13), respectively The counted value of the 4th quadrant by the 4th counter 44 is compared with the number of the 2nd criteria spits (11). Based on one of comparison results, the ink cartridge with which it is equipped identifies whether it is a color ink cartridge and whether it is a monochrome ink cartridge.

[0019] Next, the ink cartridge with which it is equipped explains with the ink cartridge identification unit of the above-mentioned configuration with reference to the flow chart which shows the processing actuation which identifies whether it is a monochrome ink cartridge and whether it is a color ink cartridge to drawing 4.

[0020] the system controller which will not be illustrated if equipped with an ink cartridge -- every block -- Heaters 1a and 1b -- sequential ON of ... is carried out, the spit of the ink is carried out from a nozzle, the number of spits is counted with each counters 41-44, and the counted value (the number of spits) is inputted into a discrimination decision circuit 5 (step S1). A discrimination decision circuit 5 totals the number of spits first obtained from each counters 41-44, counting of the total number of spits is carried out (step S2), and it judges whether to be [ more ] or it is few than 50 which is the total number of spits in case the total number of spits is a color ink cartridge (step S3). and the total number of spits -- in being >50 (in the case [ Step S3 ] of Yes), it identifies that the ink cartridge with which it was equipped is a monochrome ink cartridge (step S9), and supplies the discernment result to a system controller.

[0021] on the other hand -- the total number of spits -- in being  $\leq 50$  (in the case [ Step S3 ] of No), actuation is advanced to step S4 and then it performs the comparison with the number of spits for every quadrant, and the number of the 1st criteria spits (13) and the number of the 2nd criteria spits (11) which were set up beforehand. That is, after setting 1 as the variable N which shows a quadrant (step S4) and checking that it is not  $N=4$  at the following step S5 (namely, after checking that it is not the 4th quadrant), the number of spits and the number of the 1st criteria spits (13) of the 1st quadrant are compared (step S6). And when the number of spits is over the number of the 1st criteria spits (13) (in the case [ Step S6 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0022] On the other hand, when the number of spits is below the number of the 1st criteria spits (13) in step S6, after incrementing the value of Variable N (step S7) and checking that it is not  $N=4$  at step S5, the number of spits and the number of the 1st criteria spits (13) of the 2nd quadrant are compared (step S6). And when the number of spits is over the number of the 1st criteria spits (13) (in the case [ Step S6 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0023] On the other hand, when the number of spits is below the number of the 1st criteria spits (13) in step S6, after incrementing the value of Variable N (step S7) and checking that it is not  $N=4$  at step S5, the number of spits and the number of the 1st criteria spits (13) of the 3rd quadrant are compared (step S6). And when the number of spits is over the number of the 1st criteria spits (13) (in the case [ Step S6 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0024] On the other hand, when the number of spits is below the number of the 1st criteria spits (13) in step S6, the value of Variable N is incremented (step S7), and it checks whether it is  $N=4$  at step S5. In this case, since it is set to  $N=4$ , actuation is advanced to step S8 and the number of spits and the number of the 2nd criteria spits (11) of the 4th quadrant are compared. And when the number of spits is over the number of the 2nd criteria spits (11) (in the case [ Step S8 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the



discernment result is supplied to a system controller.

[0025] On the other hand, when the number of spits is below the number of the 2nd criteria spits (11) in step S8 (in the case [ Step S8 ] of No), it identifies that the ink cartridge with which it is equipped is a color ink cartridge (step S10), and the discernment result is supplied to a system controller.

[0026] As explained above, discernment by the same total number of spits as usual is performed first (step S3), and when the discernment result is judged not to be a monochrome ink cartridge, it is made to judge every quadrant with the gestalt of this operation continuously. That is, it enables it to identify an ink cartridge to accuracy more by newly seasoning the conventional discernment procedure with the discernment procedure of this invention. However, even if it skips step S2 and step S3 which are the conventional discernment procedure and is made to carry out only the discernment procedure of this invention (namely, step S1, step S4 - step S10), naturally an ink cartridge is discriminable to accuracy conventionally.

[0027]

[Effect of the Invention] The ink cartridge with which it is equipped is considering the ink cartridge identification unit of this invention as the configuration equipped with a discernment means identify whether it is a color ink cartridge and whether it is a monochrome ink cartridge, by comparing a count means count the number of spits corresponding to the number of nozzles of each block for every block with the number of spits of each block counted with this count means and the number of criteria spits beforehand set up for every block, respectively. That is, compared with the conventional approach judged only with the total number of spits, the class of ink cartridge with which it was equipped can be more correctly identified by comparing the number of spits for every block.

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TECHNICAL FIELD

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[Field of the Invention] The nozzle corresponding to the dot of the ink cartridge which exchange wearing was possible for the color ink cartridge and the monochrome ink cartridge, and was equipped with them is divided into two or more blocks, and this invention relates to the ink cartridge identification unit of the ink jet printer constituted so that printing control might be carried out for every block.

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PRIOR ART

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[Description of the Prior Art] The ink jet printer equipped with a means to identify conventionally whether the ink cartridge with which it was equipped is a color ink cartridge, and whether it is a monochrome ink cartridge is proposed. There are the mechanical discernment approach and the electric discernment approach in this discernment means, and the ink jet recording device of a publication is, for example in JP,9-314859,A about the mechanical discernment approach.

[0003] The height is formed in the location where the display board with which this conventional ink jet recording apparatus displays the class of color of an ink cartridge is attached in the body of equipment, and differ in a color ink cartridge and a monochrome ink cartridge, respectively. And if the display board color display was carried out [ the display board ] by the operation of the height formed in the color ink cartridge when the body of equipment was equipped with the color ink cartridge, for example equips the body of equipment with a projection and a monochrome ink cartridge from the body of equipment, the display board the monochrome display was carried out [ the display board ] by the operation of the height formed in the monochrome ink cartridge projects from the body of equipment.

[0004] On the other hand, as the electric discernment approach, discernment of a color ink cartridge or a monochrome ink cartridge is performed by counting the number of spits corresponding to the dot of the ink cartridge with which it was equipped. That is, the color ink cartridge differs in the total number of spits from the monochrome ink cartridge, and it has become 56 by 50 and the monochrome ink cartridge at the color ink cartridge. therefore, by the conventional discernment approach, it is identifying by whether the counted total number of spits exceeds 50, and the total number of spits exceeds 50 (51 or more [ namely, ]) -- it is -- to the case, it identifies that it is a monochrome ink cartridge, and in being 50 or less, it is identifying that it is a color ink cartridge.

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EFFECT OF THE INVENTION

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[Effect of the Invention] The ink cartridge with which it is equipped is considering the ink cartridge identification unit of this invention as the configuration equipped with a discernment means identify whether it is a color ink cartridge and whether it is a monochrome ink cartridge, by comparing a count means count the number of spits corresponding to the number of nozzles of each block for every block with the number of spits of each block counted with this count means and the number of criteria spits beforehand set up for every block, respectively. That is, compared with the conventional approach judged only with the total number of spits, the class of ink cartridge with which it was equipped can be more correctly identified by comparing the number of spits for every block.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, by the above-mentioned conventional electric discernment approach, when a poor nozzle occurs by failure of the heater corresponding to each dot, for example, it became impossible to have counted the spit for six nozzles of a monochrome ink cartridge, in spite of having been a monochrome ink cartridge, the total number of spits will count among 50, consequently there was a problem of carrying out a misjudgment law to it being a color ink cartridge.

[0006] By the way, an ink jet printer divides into two or more blocks the nozzle corresponding to the dot of the ink cartridge with which it was equipped, and has composition which controls and carries out the printout of the nozzle for every block, and it differs from each other by the monochrome ink cartridge and the color ink cartridge, the number of nozzles, i.e., number of spits, of each block.

[0007] It is in offering the ink cartridge identification unit which raised more the discernment precision of the ink cartridge with which it was equipped by originating this invention paying attention to such a point, and identifying for every block whether the number of spits counted for every block is the number of spits of a monochrome ink cartridge, and whether the purpose is the number of spits of a color ink cartridge.

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MEANS

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[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the ink cartridge identification unit of this invention Exchange wearing of a color ink cartridge and a monochrome ink cartridge is possible. In the ink cartridge identification unit of the ink jet printer constituted so that the nozzle corresponding to the dot of the ink cartridge with which it was equipped might be divided into two or more blocks and might carry out printing control for every block A count means to count the number of spits corresponding to the number of nozzles of said the block of each for every block, By comparing the number of spits of each block counted with this count means with the number of criteria spits beforehand set up for every block, respectively The ink cartridge with which it is equipped considers as the configuration equipped with a discernment means to identify whether it is a color ink cartridge and whether it is a monochrome ink cartridge.

[0009] Moreover, the ink cartridge identification unit of this invention In the above-mentioned configuration, while the spit corresponding to the dot of an ink cartridge is divided into four blocks from the 1st quadrant to the 4th quadrant The criteria from the 1st quadrant to the 3rd quadrant, the becoming number of the 1st criteria spits, and the criteria in the 4th quadrant and the becoming number of the 2nd criteria spits are set up. Said discernment means While comparing each counted value from the 1st quadrant by said count means to the 3rd quadrant with said number of the 1st criteria spits, respectively The ink cartridge equipped with the counted value of the 4th quadrant by said count means based on one of comparison results as compared with said number of the 2nd criteria spits identifies whether it is a color ink cartridge and whether it is a monochrome ink cartridge.

[0010] Moreover, the ink cartridge identification unit of this invention In the above-mentioned configuration, said discernment means carries out the sequential comparison of each counted value and said number of the 1st criteria spits from the 1st quadrant by said count means to the 3rd quadrant. When counted value is over the number of the 1st criteria spits in one of comparisons Identify that the ink cartridge with which it is equipped is a monochrome ink cartridge, and when counted value is below the number of the 1st criteria spits in all comparisons next, when the counted value and said number of the 2nd criteria spits of the 4th quadrant are compared and counted value is over the number of the 2nd criteria spits as a result of the comparison It identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge, and when counted value is below the number of the 2nd criteria spits, it identifies that the ink cartridge with which it is equipped is a color ink cartridge.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 2 and drawing 3 show an example of arrangement of the contact contact when turning the nozzle of the electric terminal of an ink cartridge pen downward, and seeing it, drawing 2 is the plot plan of a monochrome ink cartridge, and drawing 3 is the plot plan of a color

ink cartridge.

[0012] Arrangement of the whole contact contact does not change a monochrome ink cartridge or color ink cartridge, either, so that clearly from drawing 2 and drawing 3 , but by the color ink cartridge, there are many six contact contacts which are not used compared with a monochrome ink cartridge, therefore when it sees in the total of a contact contact, the contact contact of 56 pieces (the number of spits is 56) and a color ink cartridge is [ the contact contact of a monochrome ink cartridge ] 50 pieces (50 spits). Thus, the arranged contact contact is divided into four blocks B1 - B4, and C1-C4, respectively, and carries out a printout by performing ON of a contact contact, and OFF control for every block.

[0013] If each quadrant (block) compares the contact contact of a monochrome ink cartridge, and the contact contact of a color ink cartridge, here The 1st quadrant B1 and C1 to the 3rd quadrant B3 and C3 The number of contact contacts of 14 pieces and a color ink cartridge is [ the number of contact contacts of a monochrome ink cartridge ] 13 pieces. In 4th quadrant B4 and C4 The number of contact contacts of 14 pieces and a color ink cartridge is [ the number of contact contacts of a monochrome ink cartridge ] 11 pieces. In addition, as shown in drawing 2 and drawing 3 , the number to 1-56 is given to the contact contact, and this number is in agreement with the number of the nozzle which is not illustrated.

[0014] Drawing 1 is the block diagram showing the electric configuration of the ink cartridge identification unit of this invention including the contact contact arranged in this way. namely, for the common leads L1-L4 of each block which each block has the same composition and is connected to supply voltage (+24V) through each resistance R1-R4 Heaters 1a and 1b of the number corresponding to the number of nozzles of each block ... The end section is connected, respectively. The other end switching device (it corresponds to contact contact shown in drawing 2 and drawing 3 ) 2a by which OFF control is turned on and carried out in the drive circuit which is not illustrated, and 2b -- it connects with the ground through ...

[0015] Moreover, the electrical-potential-difference conversion circuits 31-34 which transform supply voltage (+24V) into 5V electrical potential difference are connected to the common leads L1-L4 of each block, respectively, and the output of each electrical-potential-difference conversion circuits 31-34 is connected to the 1st thru/or the 4th counter 41-44 which counts the number of nozzles of each block (namely, the number of spits), respectively. And the counted value of each counters 41-44 is led to the discrimination decision circuit 5 which identifies the class (is it a color ink cartridge and is a monochrome ink cartridge?) of ink cartridge with which it is equipped, and is given to the system controller with which the discernment result in a discrimination decision circuit 5 controls the whole printer which is not illustrated.

[0016] the 1st thru/or the 4th counter 41-44 -- switching device 2a and 2b ... turns on -- Heaters 1a and 2a -- if ... energizes, this will be detected and it will count up. Therefore, if a heater carries out an open circuit etc. and breaks down, the spit of the nozzle corresponding to the heater will not count. It identifies whether the ink cartridge with which it is equipped by comparing the number of spits of each block counted with these [ 1st ] thru/or the 4th counter 41-44 with the number of criteria spits beforehand set up for every block, respectively is a color ink cartridge, and whether a discrimination decision circuit 5 is a monochrome ink cartridge.

[0017] Here, with the gestalt of this operation, since the number of contact contacts of a monochrome ink cartridge and a color ink cartridge is the same (a monochrome ink cartridge is 14 pieces and a color ink cartridge is 13 pieces), the 1st quadrant to the 3rd quadrant sets the number of the 1st criteria spits used as the criteria from the 1st quadrant to the 3rd quadrant as 13. Moreover, the number of contact contacts of the monochrome ink cartridge in the 4th quadrant sets as 11 the number of the 2nd criteria spits which serves as criteria in the 4th quadrant since the number of contact contacts of 14

pieces and a color ink cartridge is 11 pieces.

[0018] Namely, while a discrimination decision circuit 5 compares each counted value from the 1st quadrant by the 1st thru/or the 3rd counter 41-43 to the 3rd quadrant with the number of the 1st criteria spits (13), respectively The counted value of the 4th quadrant by the 4th counter 44 is compared with the number of the 2nd criteria spits (11). Based on one of comparison results, the ink cartridge with which it is equipped identifies whether it is a color ink cartridge and whether it is a monochrome ink cartridge.

[0019] Next, the ink cartridge with which it is equipped explains with the ink cartridge identification unit of the above-mentioned configuration with reference to the flow chart which shows the processing actuation which identifies whether it is a monochrome ink cartridge and whether it is a color ink cartridge to drawing 4.

[0020] the system controller which will not be illustrated if equipped with an ink cartridge -- every block -- Heaters 1a and 1b -- sequential ON of ... is carried out, the spit of the ink is carried out from a nozzle, the number of spits is counted with each counters 41-44, and the counted value (the number of spits) is inputted into a discrimination decision circuit 5 (step S1). A discrimination decision circuit 5 totals the number of spits first obtained from each counters 41-44, counting of the total number of spits is carried out (step S2), and it judges whether to be [ more ] or it is few than 50 which is the total number of spits in case the total number of spits is a color ink cartridge (step S3). and the total number of spits -- in being  $>50$  (in the case [ Step S3 ] of Yes), it identifies that the ink cartridge with which it was equipped is a monochrome ink cartridge (step S9), and supplies the discernment result to a system controller.

[0021] on the other hand -- the total number of spits -- in being  $\leq 50$  (in the case [ Step S3 ] of No), actuation is advanced to step S4 and then it performs the comparison with the number of spits for every quadrant, and the number of the 1st criteria spits (13) and the number of the 2nd criteria spits (11) which were set up beforehand. That is, after setting 1 as the variable N which shows a quadrant (step S4) and checking that it is not  $N=4$  at the following step S5 (namely, after checking that it is not the 4th quadrant), the number of spits and the number of the 1st criteria spits (13) of the 1st quadrant are compared (step S6). And when the number of spits is over the number of the 1st criteria spits (13) (in the case [ Step S6 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0022] On the other hand, when the number of spits is below the number of the 1st criteria spits (13) in step S6, after incrementing the value of Variable N (step S7) and checking that it is not  $N=4$  at step S5, the number of spits and the number of the 1st criteria spits (13) of the 2nd quadrant are compared (step S6). And when the number of spits is over the number of the 1st criteria spits (13) (in the case [ Step S6 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0023] On the other hand, when the number of spits is below the number of the 1st criteria spits (13) in step S6, after incrementing the value of Variable N (step S7) and checking that it is not  $N=4$  at step S5, the number of spits and the number of the 1st criteria spits (13) of the 3rd quadrant are compared (step S6). And when the number of spits is over the number of the 1st criteria spits (13) (in the case [ Step S6 ] of Yes), it identifies that the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0024] On the other hand, when the number of spits is below the number of the 1st criteria spits (13) in step S6, the value of Variable N is incremented (step S7), and it checks whether it is  $N=4$  at step S5. In this case, since it is set to  $N=4$ , actuation is advanced to step S8 and the number of spits and the number of the 2nd criteria spits (11) of the 4th quadrant are compared. And when the number of spits is over the number of the 2nd criteria spits (11) (in the case [ Step S8 ] of Yes), it identifies that



the ink cartridge with which it is equipped is a monochrome ink cartridge (step S9), and the discernment result is supplied to a system controller.

[0025] On the other hand, when the number of spits is below the number of the 2nd criteria spits (11) in step S8 (in the case [ Step S8 ] of No), it identifies that the ink cartridge with which it is equipped is a color ink cartridge (step S10), and the discernment result is supplied to a system controller.

[0026] As explained above, discernment by the same total number of spits as usual is performed first (step S3), and when the discernment result is judged not to be a monochrome ink cartridge, it is made to judge every quadrant with the gestalt of this operation continuously. That is, it enables it to identify an ink cartridge to accuracy more by newly seasoning the conventional discernment procedure with the discernment procedure of this invention. However, even if it skips step S2 and step S3 which are the conventional discernment procedure and is made to carry out only the discernment procedure of this invention (namely, step S1, step S4 - step S10), naturally an ink cartridge is discriminable to accuracy conventionally.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the electric configuration of the ink cartridge identification unit of this invention.

[Drawing 2] It is the plot plan of the contact contact when turning the nozzle of the electric terminal of a monochrome ink cartridge pen downward, and seeing it.

[Drawing 3] It is the plot plan of the contact contact when turning the nozzle of the electric terminal of a color ink cartridge pen downward, and seeing it.

[Drawing 4] It is a flow chart for explaining the processing actuation which identifies whether the ink cartridge with which it is equipped is a monochrome ink cartridge, and whether it is a color ink cartridge.

[Description of Notations]

1a, 1b Heater

2a, 2b Switching device (contact contact)

5 Discrimination Decision Circuit

31-34 Electrical-potential-difference conversion circuit

41 1st Counter

42 2nd Counter

43 3rd Counter

44 4th Counter

L1-L4 Common lead

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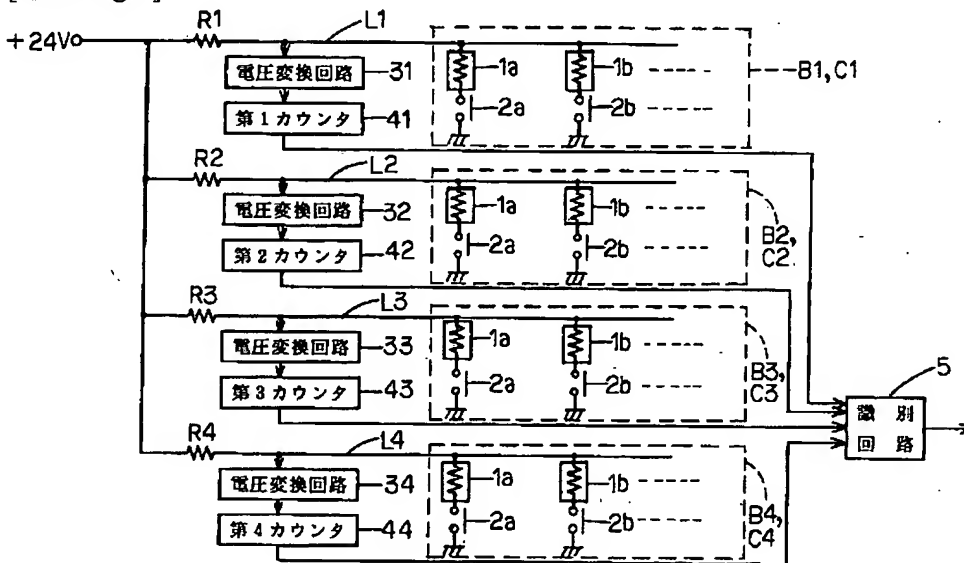
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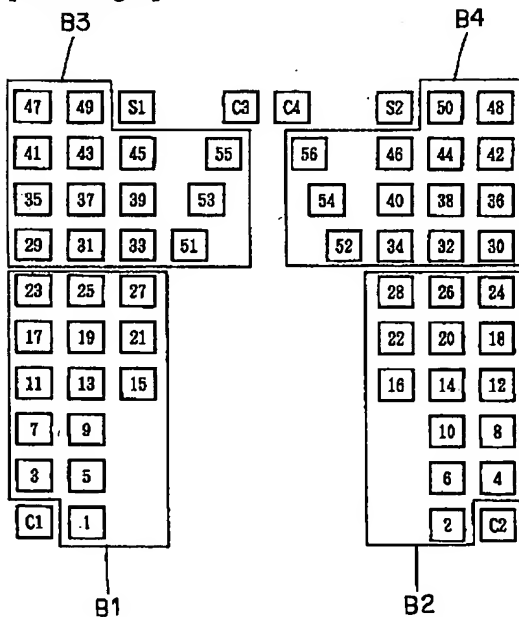
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DRAWINGS

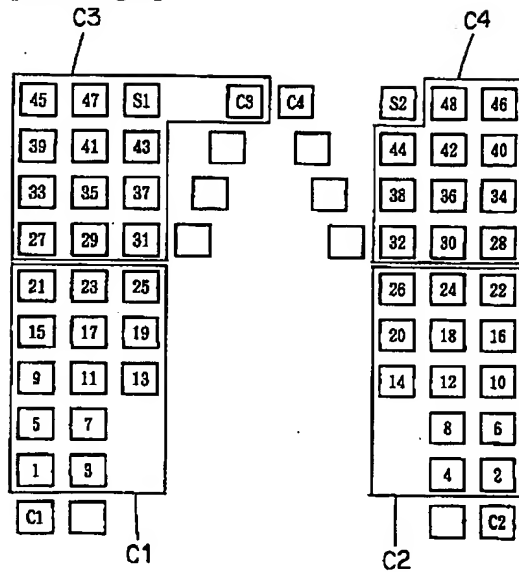
[Drawing 1]



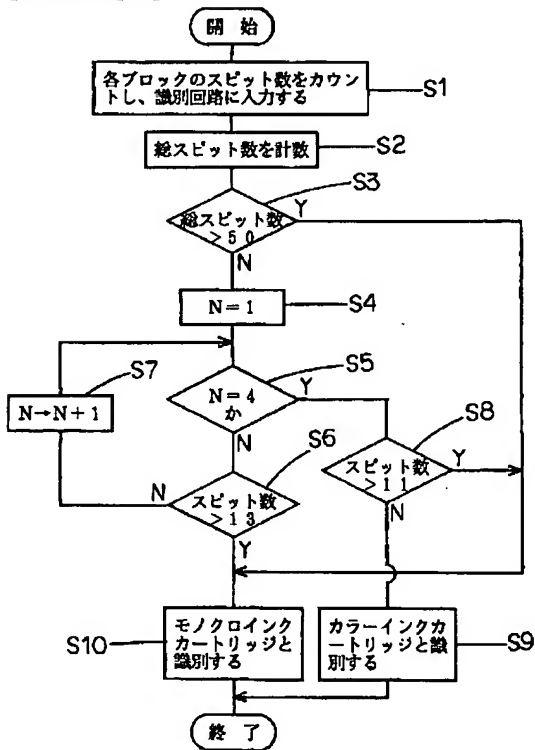
[Drawing 2]



[Drawing 3]



[Drawing 4]



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